

Long-term strategy of organization development (LSOD)

Advanced Automated Command and Control System II (AACCS II)

Research specification

As one of the many areas enabling substantial innovation and increasing efficiency in the command and control processes, is a field of the rationalization and automatization of the decision-making processes, including the integration of advanced robotic systems in the subsequent implementation of the "operational-tactical" decisions process. Specifically, it is the development of the computer supported decision-making process conducted by command elements (commanders and staffs) and its implementation in the process of planning, control and realization of tactical activities, which was until now neglected because decision-making processes was in the long term based on particularly empirical-intuitive approaches.

It is believed (and experience confirms it) that the conditions and dynamics of the battlefield in the 21st century will be incomparably more complex in comparison with recent armed conflicts. The success of military operations will be largely dependent on the ability to solve complex decision-making (operational-tactical) tasks and quick response in real time (automatization processes). It is already very difficult only in the framework of the empirical-intuitive approach to achieve qualitatively comparable results with mathematical model approaches (based on advanced artificial intelligence methods), especially in the context of the integration of C4ISR and application of automated robotic systems, which are primarily dedicated to issues this project. The project is patterned on the project AACCS (2012-2015) and aimed on achieved results further development in the concept in the context of advanced battlefield digitization and robotics.

Research objectives

LSOD main objective is to design, construct and verify the effectiveness (usability) of the basic core Advanced Automated Command and Control System - new generation (AACCS II, which is in the Czech army entirely new matter).

The main objective is to research theoretical apparatus and develop (realization) communication and hardware infrastructure, command and control system for future military operations, integrating elements of automation (intelligence) analysis, processing of operational information and automated real-time control, computer generated optimal variants of friendly forces (in coordination with the commander's need) activities and implementation of advanced robotic devices.

The sub-objectives of the project include:

- 1) Elaboration / completion / extension of the mathematical apparatus for optimization of decision of selected tactical tasks
- 2) Development of design proposal, documentation and construction of additional functional samples (FS) expanding functionality of the automated command and control system
- 3) Development of superstructure communication subsystem AACCS II enabling a compatible connection with already established systems C4ISR of the Czech army, priority ISVR PozS, or other
- 4) Experimental verification functionality of AACCS II in training, focused on a qualitative difference in

the effectiveness of the combat task fulfilling in case of deployment of the system with the implementation of advanced decision support and robotic system resources and without

- 5) Verification of the application of Crew Resource Management system is AACCS II
- 6) Development of sensors for measurement and continuous monitoring of indicators related to physiological, biochemical and other body reactions to stress during performance of activities
- 7) Identification and analysis of factors affecting future operational-strategic and political environment, focused on the pragmatic aspects of highly automated systems in the socio-economic and legislative context of future military operations.

From the perspective of the existing empirical-intuitive approach to computer support decision-making process, it is clear that effective management of operations in the 21st century without the deployment of advanced robotic equipment and modern automated command and control systems (C4ISR / V21) is not possible. This fact is already evident at a glance on concepts and trends in contemporary armed conflicts and strong focus on scientific and technological development of advanced automated and robotic systems, which is in the advanced armies of the world's attention.

The results of the project are related to the general project period between the years 2016-2020. Applied research will be focused mainly on the MaS in the military, the development of systems to support tactical decisions, solving operational-tactical tasks, implementation of artificial intelligence in the process of combat operations atc. The issue will be published in foreign journals included in WoS, Scopus and ERIH.

The research results will be continuously updated in line with the fulfillment of the set objectives of the project.

Schedule results:

2016: Jimp 3x, 13x D, 1 G, 1 R

Year 2017-2020: Jimp 12x, 62x D, 5 G, 4 R

These include:

Mathematical apparatus of the optimization decision of selected tactical tasks and to transform this mathematical model into the system of software applications capable to solve the problems with current data from the battlefield in real time, including the development of methods and data mining and concept of BigData for intelligence analysis.

Development of design proposal, documentation and construction of additional functional samples (FS) expanding functionality of the automated command and control system, namely:

- Wireless control of "mini" gun carriage of personal weapons (gun carriages III and IV).
- Upgrade of commanding container for planning and control of tactical operations and control of unmanned robotic devices (CABIN II).
- Helicopter UAVs II with tandem rotors (UAV).
- Autonomous moderate UGV (1-2 tons).
- Tactical VR simulator for training and validation of tactical scenarios.
- To construct a second-generation core of personnel and vehicle system with sufficient functionality for checking / fulfilling of the sub aim no. 3.
- Integrate control possibilities of the FS into the system core AACCS II.
- Develop a communication subsystem superstructure AACCS II enabling a compatible connection with already established systems ASVŘ in Czech army.
- To verify the functionality AACCS II in training.
- Check the possibilities of CRM and future social-economist. environment.
- and more.